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Physical &
Applied Sci.
Serials

Fifty-third Annual Report of the Savilian Professor of Astronomy to the Visitors of the University Observatory for 1927 (*part*).

BOARD OF VISITORS, 1928 (Feb. 2).

The Vice-Chancellor (F. W. Pember, D.C.L., Warden of All Souls).
The Senior Proctor (E. L. Woodward, M.A., Fellow of All Souls).
The Junior Proctor (H. M. D. Parker, M.A., Fellow of Magdalen).
The Astronomer Royal (Sir F. W. Dyson, Hon. D.Sc., F.R.S.).
The Director of the Cambridge Observatory (Professor A. S. Eddington, Hon. D.Sc., F.R.S.).
The Radcliffe Observer (H. Knox-Shaw, M.A., D.Sc., Trinity).

J. H. Jeans, Hon. D.Sc., Sec. R. S. A. E. H. Love, M.A., D.Sc., F.R.S., Fellow of Queen's.	Until Oct., 1930.
T. W. Chaundy, M.A., Student of Christ Church. G. M. B. Dobson, M.A., D.Sc., Lincoln, Lecturer in Meteorology.	Until Oct., 1935.

The decision of the Board to hold their annual meeting early in the Lent Term suggests that the period covered by the report in future should be the calendar year. The present report thus refers to the period from March 1, 1927, to December 31, 1927.

I. Staff.

For some years past Mr. J. S. Hughes has been attached to the staff in an informal manner, without expense to the University, and has efficiently dealt with the mass of Seismological Observations so as to deduce the times and places of all earthquakes of any interest. As a result there are now seven years of systematic records available for reference and discussion. The Board will be asked to consider whether the University can undertake to provide, for the next five years, Mr. Hughes's salary or a portion of it, in order that this useful work may be continued on a less uncertain footing. A separate memorandum on this request will be presented to the Board.

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II. Teaching.

The usual lectures in the Michaelmas Term for the Mathematical Schools were given, by the courtesy of Professor Townsend, in the Electrical Laboratory, since the building operations mentioned below made it necessary to use the Observatory lecture-room for storing the books from the library.

The usual practical instruction was given under some difficulties owing to the same operations; and others arising from the specially cloudy weather of the Michaelmas Term.

The total solar eclipse of June 29 naturally brought a number of calls for lectures of a popular character, both in Oxford and elsewhere.

III. Research and Publications.

The international project for photographing the whole sky by the co-operation of eighteen Observatories was initiated at Paris in 1887. Two series of publications were contemplated—(*a*) a series of charts or maps showing stars to the fourteenth magnitude, (*b*) a catalogue of stars to the eleventh magnitude. Professor Pritchard undertook one of the eighteen shares in this work; but there has never been any serious suggestion of publishing the charts (mentioned as (*a*) above), which was estimated (at the end of the nineteenth century) to involve an expenditure of about £10,000 for each Observatory. Some of these charts have been published (e. g. the Royal Observatory, Greenwich, have published their section completely), and copies kindly presented by that Observatory and several others are stored in a large case at the University Observatory. But it seems doubtful whether this part of the work will be completed, though contributions continue to flow in slowly.

Part (*b*) of the work, the catalogue, has been taken seriously from the outset, and this Observatory was the first to complete its share in manuscript, though difficulties in finding funds for printing delayed the completion in type until after the whole of the Greenwich portion had been printed. Two Observatories which started their work much later than their colleagues, owing to the fact that they stepped in to replace defaulters, viz. Perth (West Australia), which was generously helped by the Royal Observatory, Edinburgh, and the Nizam's Observatory at Hyderabad, have fallen short of a completion which might otherwise have been attained, the former because of difficulties in finding funds for printing the portion measured at Edinburgh, and the latter because the Nizam has extended his original undertaking of a half-zone (the other half being taken by Santiago) to the whole zone, when progress in the other half was defective. The Cape Observatory has just issued its final volume ; San Fernando (Spain) is on the point of completion, and two of the four French Observatories have printed the whole of their measures. After the Oxford portion had been completed, it appeared that we could materially assist the Vatican Observatory by supplying the necessary computations for measures made in Rome by the ladies of a religious Order. Funds for the actual computing were supplied from Rome, and the Board has approved the contribution of supervision by Mr. and Miss Bellamy. The tenth and final volume of this (Vatican) section is now half printed, so that the completion of another contribution is in sight.

Meanwhile the Director has undertaken, at the request of the International Astronomical Union, the Chairmanship of the Committee charged with this work, which has since the War replaced the organization initiated in 1887 at Paris ; and it thus falls to him specially to aim at the completion of the whole work, which has been very seriously delayed in many ways. Early in the history of the work the unexpected discovery of the little planet Eros caused a distraction. It appeared that a very favourable opportunity for measuring the Sun's distance would occur in 1900, far too important to be neglected. It was satisfactorily seized, but at the cost of a serious interruption to the main work. More recently there arose in Australia an unfortunate difference of opinion as to whether funds for this astrographic work should continue to be provided by the States which had originally undertaken it, or by the more recently established Commonwealth ; the Melbourne and Sydney portions are consequently disastrously in arrear. But an even more serious difficulty has arisen owing to the War, which has led to the withdrawal of the Potsdam Observatory from the co-operative scheme. At the meeting of the Union at Cambridge in 1925 the Belgian astronomers hoped that this portion might be undertaken at Uccle; but after much delay word has now been received that the Belgian Government does not see its way to support them. In default of other alternatives, it is a question therefore whether this Observatory might extend its section northwards so as ultimately to cover the Potsdam zone. The suggestion is not made without hesitation, and can only be entertained if funds for computing and printing could be provided without expense to the University. But if this condition can be fulfilled, Mr. Bellamy has expressed his willingness to undertake this further work after the Vatican zone is completed; and I hope therefore that the Visitors may again approve this devotion of his great experience to the furtherance of this international project, which has cost far more time and trouble than was at first rather light-heartedly foreseen, but is now showing signs of possible attainment.

The preparation of the International Seismological Summary has been already briefly mentioned. Funds for the printing are provided by the International Union of Geodesy and Geophysics; or rather by the Section of Seismology which forms one of the six (Geodesy, Meteorology, Magnetism, Seismology, Oceanography, Hydrology) into which the whole Union is divided. The preparation of the text is the special work of Mr. J. S. Hughes aided by a computer, funds for the latter having been provided by a British Association grant, and for the former partly by the generosity of Dr. Crombie of Aberdeen, and partly by the Royal Society or the Department of Scientific and Industrial Research. This work grew out of that initiated by John Milne, and was undertaken as a provisional arrangement on his death in 1913. The almost immediate sequel of the War made transference to other hands difficult; several endeavours to this end have failed, and the connexion with Oxford has gradually become established. It seems eminently desirable that the work should be continued. Several investigations naturally arising out of it have already been mentioned in these Reports, and others are in progress.

Dr. Fotheringham (Honorary Assistant) has reviewed previous studies of the mass of Venus, in some of which he has found numerical errors which affect the determined mass of Venus and to a certain extent other terms in the Sun's longitude, and he has himself determined from the Greenwich meridian observations 1868–1916 the mass of Venus as it appears in the two largest Venus terms in the Sun's longitude. He finds that the co-efficients of the terms have a common fluctuation, which could easily be explained as a fluctuation of the mass of Venus, though there are obvious difficulties in accepting this as the true explanation.

It may be added that his work on the secular accelerations of the Moon and other bodies (probably to be explained as a change in the length of the day) has recently received almost sensational confirmation from the identification (by Herr Schoch) of the eclipse of Ur, 2283 B.C.

The following papers by members of the Staff have been published since the last Report:—

"Change in the Length of the Day," by J. K. Fotheringham. *Nature* (1927, February 26).

"The Total Solar Eclipse of June 29, 1927," by H. H. Turner. *The School Science Review*, No. 31 (1927, February).

"Corrections to the Mass of Venus," by J. K. Fotheringham. *Mon. Not.*, Vol. LXXXVII, p. 582 (1927, June).

"The Total Solar Eclipse of June 29, 1927: Report of the Oxford Expedition to Southport." *Mon. Not.*, Vol. LXXXVII, p. 665 (1927, October).

IV. Buildings and Grounds.

The extension of the library, with provision of a basement below for the seismographs, is now in progress, and promises to be an addition of the greatest value. During fifty years the accumulation of astronomical observations and records of all kinds—even our own photographs and reductions—has gradually occupied all available space in the Observatory, with some consequent inconveniences; but the new rooms will relieve this pressure for some time to come, and to have the seismographs at hand will be a great gain. It will no doubt also be a great convenience to Professor Lindemann to have the room set free which he has so long lent us.

The covering of the corridor roof with copper has not been entirely satisfactory, as there is condensation under the copper sheets; but this difficulty may be overcome.

The building operations have necessitated a good deal of temporary arrangement both in the Observatory and its surroundings, which has meant extra work for the staff, including Mr. George Neale. It is a pleasure to record that it has been ungrudgingly given.

V. Equipment, Library, &c.

The brasswork of the Astrographic Equatorial still suffers from corrosion, of which the source has not yet been traced. The object-glass of the photographic telescope was taken to Southport for observation of the eclipse of June 29, provided with a temporary mounting. It has been returned safely and in good order. It was similarly taken to Egypt for observation of the eclipse of August 30, 1905: and it is proposed to lend it next year to the Radcliffe Observer for similar use in Sumatra on May 9.

The transit-circle has been thoroughly cleaned since the partial exposure to which it was subjected during repairs to the corridor roof, and a new support for the level has been supplied.

The Trustees of the Leigh Fund kindly made it possible to purchase a 16-inch Coelostat, and to have it put in efficient repair by Messrs. Grubb, Parsons & Co. It was taken to Southport for observation of the eclipse of June 29, and has been returned in good order.

Much of the work of preparation for this year's eclipse fell on Mr. Bellamy during the absence of the Director in

California (March and April): and the Radcliffe Observer, who joined in the expedition to Southport, was similarly constrained to take a larger share in these preparations than he had at first contemplated. The cordial thanks of the Director are due to them both for this timely help.

Wooden tubes for the mounting of a polariscopic apparatus for the eclipse were made by Mr. George Neale. The 'Abney' lens and an equatorial mounting were kindly lent by the Royal Astronomical Society; and a chronometer by the Admiralty. These have been safely returned and acknowledged.

A small transit telescope has been recently purchased. It was thought of as an addition to the equipment, but it appears to have a greater historical interest, though its career has not yet been actually traced; it is similar to one pictured by Le Monnier as of date 1737, and is therefore contemporary with Bradley.

VI. Miscellaneous.

The joint Eclipse expedition to Southport from the Radcliffe and University Observatories has already been mentioned in other connexions. Unfortunately, the weather was atrocious right up to the day of the Eclipse, making the adjustment of the instruments extremely difficult and uncertain; and though the Sun was visible, almost for the first time, on the morning of June 29, there was enough cloud to render the photographs of little value scientifically. The programme of work was, however, successfully carried through; and it is matter for real satisfaction that the quarter of a million people who came to Southport, in great part attracted by the knowledge that astronomers had chosen it for pitching their tent, were not entirely disappointed. The Corona was distinctly visible, and they recognized the impressive nature of the phenomenon.

In September the Director attended the meeting of the International Union of Geodesy and Geophysics at Prague, and was re-elected President of the Section of Seismology. It is a pleasure to acknowledge the great kindness and hospitality shown us all by Czecho-Slovakia, and to note the evidences of devotion to scientific work which met us in many directions.

The astronomers present visited the tomb of Tycho Brahe, on which the Astronomer Royal laid a wreath ; and we were shown the house in which Kepler lived, and in which he probably constructed his three immortal laws.

The Eclipse brought a number of visitors to England, in spite of its brief duration and uncertain conditions. We were specially glad to welcome at Oxford Professor Anne S. Young from Mount Holyoke, and Miss Calvert from the Yerkes Observatory ; also Professor Hasimoto from Japan.

Father Lynch again spent some weeks working at Seismology during the summer.

H. H. TURNER.

UNIVERSITY OBSERVATORY,
OXFORD.
January 23, 1928.